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TOWARD AN OPTAR ALLOCATION MODEL
FOR SURFACE SHIPS THE PACIFIC FLEET

by

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This thesis examines the OPTAR allocation process utilized by the Commander Naval Surface Forces, U.S. Pacific Fleet comptroller. The objective of this thesis is to develop a useable OPTAR forecasting model to assist the comptroller in effectively allocating funds to the fleet. The OPTAR grant data of Newport class LST's and Spruance class destroyers were studied to identify the relationship between OPTAR spending patterns of surface ships and their operating schedules. An OPTAR allocation model was developed for each class of ships. The models utilize critical events in a ships employment schedule to forecast quarterly requirements. The models were designed to be easily and effectively implemented by the comptroller and his staff to assist in the allocation process.


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# Toward an OPTAR Allocation Model for Surface Ships of the Pacific Fleet

by

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# ABSTRACT

This thesis examines the OPTAR allocation process utilized by the Commander Naval Surface Forces, U.S. Pacific Fleet comptroller. The objective of this thesis is to develop a useable OPTAR forecasting model to assist the comptroller in effectively allocating funds to the fleet. The OPTAR grant data of Newport class LST's and Spruance class destroyers were studied to identify the relationship between OPTAR spending patterns of surface ships and their operating schedules. An OPTAR allocation model was developed for each class of ships. The models utilize critical events in a ships employment schedule to forecast quarterly requirements. The models were designed to be easily and effectively implemented by the comptroller and his staff to assist in the allocation process.

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# I. INTRODUCTION

## A. BACKGROUND

With increased attention on defense expenditures by Congress and the general public, military financial managers must constantly do more with less. Therefore, it is important that funds are allocated when they are needed and where the need is greatest.

The annual operating costs for the U.S. Navy can run into the millions of dollars per ship. The task of allocating these funds for surface ships in the Pacific fleet falls to the Commander Naval Surface Fleet Pacific (COMNAVSURFPAC) comptroller. Presently the COMNAVSURFPAC comptroller merely calculates the average cost of each ship type to come up with an annual OPTAR (OPerating TARget) allocation. These annual allocations are then divided into four equal amounts to produce the quarterly OPTAR grants. To take into account the problem of changing fund requirements, a process of loaning out future quarterly OPTAR grants is used. There is no attempt made to relate OPTAR needs with initial OPTAR allocations. It is left to each ship to determine its own individual funding needs, based on their employment schedule, and request a loan or an additional OPTAR grant. This process creates an unnecessary shuffling of funds at the end of each quarter and may result in an avoidable misallocation of funds.

Two previous Naval Postgraduate School theses have explored the relationship between OPTAR spending patterns of surface ships and their operating schedules. In the first study, Williams concluded that there was no relationship between OPTAR spending patterns and the number of days a ship was underway. (Williams,

1987). In the second study, Hanson and Kuker demonstrated the feasibility of developing an OPTAR forecasting and allocation model based on a ships' employment schedule. Their work provides the theoretical basis for relating OPTAR spending patterns and a ships' employment schedule. (Hanson and Kuker, 1988)

Neither thesis was of much value to the COMNAVSURFPAC comptroller responsible for making OPTAR allocations to the Pacific surface fleet, however. The first thesis approached the OPTAR forecasting and allocation process from the point of cash management in the civilian sector. While this approach is correct conceptually, it did not provide an OPTAR allocation model for the comptroller, and it failed to establish a relationship between OPTAR spending and the number of days a ship spends underway (Williams, 1987). The second thesis focused on establishing the relationship between a ships' employment schedule and OPTAR spending rates. The thesis developed a forecasting model based on obligation data, broken down into fund codes, and highly specific employment categories. The model they developed was complex and difficult to implement because of the difficult transformation of data that would have been required. Because of these shortcomings their model was not implemented by the comptroller. (Hanson and Kuker, 1988)

## B. PURPOSE

The purpose of this thesis is to develop a useable OPTAR forecasting and allocation model to assist the COMNAVSURFPAC comptroller in effectively allocating funds to the fleet.

## C. THE RESEARCH QUESTION

Is it possible to develop an OPTAR forecasting and allocation model, utilizing OPTAR grant data and ship employment schedules, that is both reliable and easy to use?

## D. SCOPE AND LIMITATION

Data collection in this thesis involved a random sampling of two different ship classes from the Pacific surface fleet. The two classes sampled were Newport class LST's and Spruance class destroyers. These ship classes represent the low and high cost ends of the OPTAR allocation spectrum respectively.

This thesis does not consider the impact of the movement of funds from one class of ship to another within COMNAVSURFPAC. It also does not address the the question of what is adequate funding for a particular ship or for a particular class of ships. Rather the study examines the allocation of funds within a class of ships, and subsequent adjustment, given a few significant events in their operational schedule.

## E. ASSUMPTIONS

First, this study assumes that the ships spend all funds granted to them in a fiscal quarter. No attempt was made to determine the unobligated balance for each ship at the end of each quarter. It is assumed that the amount of unobligated balance is considered insignificant or that the controller considered it acceptable and did not try to reallocate those funds elsewhere. Further justification for the use of actual total quarterly OPTAR grants will be discussed in Chapter II.

Second, this study assumes that the ships spend their funds in a rational manner. This means funds are not spent frivolously. All ships are considered to have the same conservative philosophy concerning fund expenditure.

Another assumption is that each class of ships is considered homogeneous with respect to systems and equipment. The time available for this study does not allow any attempt to identify cost differences between ships with different configurations or the impact of new systems installed during an overhaul.

It is also assumed that there is no need to correct for inflation. The justification for this assumption is that the data covers a relatively short four year period when the inflation rate was moderate.

## F. METHODOLOGY

At the request of the comptroller two classes of ships were chosen for the study; Newport class LST's and Spruance class destroyers. From each of these classes a sample of ships were selected for further analysis.

Once the sample ships were chosen, OPTAR grant data, and subsequent adjustments, from the Ships OPTAR Detail Listing and employment data from the Quarterly Employment Schedules were obtained for a four fiscal year period.

A multiple regression analysis was conducted to identify significant factors helpful in forecasting future OPTAR expenditures. This analysis resulted in the development of a simple, but not simplistic, model that is easy for the comptroller and his staff to implement and use.

## G. ORGANIZATION OF THE THESIS

Chapter II of this study summarizes the results of the previous efforts and provides descriptive information about the samples used in this study and data collection procedures. Chapter III contains the analysis of the raw data found in the appendices and describes the development of each of the models. Chapter IV presents both models and offers conclusions and recommendations for the

comptroller. The raw data is presented in the appendices. Appendix A contains the OPTAR data and Appendix B contains the employment data used in developing the models.

# II. DATA COLLECTION

## A. REVIEW OF PREVIOUS STUDIES

Two previous theses have explored the relationship between OPTAR spending patterns of surface ships and their operating schedules. In both efforts, Belknap (CG-26) class cruisers and Knox (FF-1052) class frigates were studied.

In the first study, Williams examined the relationship between OPTAR spending patterns and the number of days a ship was underway. Based on the regression analysis, he concluded that the relationship does not exist. However, he also concluded that there were some identifiable patterns between OPTAR spending rates and the employment schedule when he conducted a variance analysis. He did not attempt to develop an OPTAR allocation model for the comptroller. (Williams, 1987)

In the second study, Hanson and Kuker demonstrated the feasibility of developing an OPTAR forecasting and allocation model based on a ship's employment schedule. Their work provides the theoretical basis for relating OPTAR spending patterns and a ships employment schedule. Their final model relied upon the use of OPTAR obligation data. (Hanson and Kuker, 1988)

Hanson and Kuker's preliminary OPTAR allocation model uses fund codes, which are used to report obligations, instead of the broader allocation categories called repair parts (RP) and other OPTAR (OO) used by the comptroller in the allocation process. The model they developed was complex and difficult to implement because of the difficult transformation of data that would have been

required. Because of these shortcomings, implementation was not attempted by the comptroller.

This thesis expands on their work and attempts to develop a model for two different classes of ships using actual quarterly OPTAR grant data instead of the obligation data used in their study. The models should be easy for the comptroller to implement and as reliable as the Hanson and Kuker model.

## B. THE NEWPORT CLASS TANK LANDING SHIPS (LST)

Newport class Tank Landing Ships (LST) have a unique mission in the Navy. They are the only ships that regularly run themselves aground on sandy beaches. They do this to bring ashore tanks, heavy vehicles, engineering equipment and various other supplies, for the Marines, not easily landed with helicopters or landing craft. They travel with amphibious groups and carry a relatively small contingent of Marines. The ships have relatively few sophisticated and expensive weapons systems aboard them. They have the capability of carrying approximately 400 troops and 500 tons of vehicles and equipment.

## C. THE SPRUANCE CLASS DESTROYERS (DD)

Spruance class destroyers represent the high tech and high cost end of the spectrum at COMNAVSURFPAC. Antisubmarine warfare (ASW) is their primary mission. They carry MK 32 torpedoes, two 5 inch guns, are tomahawk capable, and have various other sophisticated antimissle and antisubmarine weapons systems. They typically deploy with carrier battle groups and provide ASW services for the fleet.

## D. SHIPS CHOSEN FOR STUDY

There are nine Newport class LST's assigned to COMNAVSURFPAC. All nine ships were used in this study. Table I presents general information about the ships studied.

**TABLE I LST General Information**

| Ship Name | Hull Number | Homeport |
|---|---|---|
| USS Fresno | LST-1182 | Long Beach, Ca |
| USS Peoria | LST-1183 | San Diego, Ca |
| USS Frederick | LST-1184 | San Diego, Ca |
| USS Schenectady | LST-1185 | San Diego, Ca |
| USS Cayuga | LST-1186 | Long Beach, Ca |
| USS Tuscaloosa | LST-1187 | San Diego, Ca |
| USS San Bernardino | LST-1189 | Sasebo, Japan |
| USS Barbour County | LST-1195 | San Diego, Ca |
| USS Bristol County | LST-1198 | San Diego, Ca |

Currently there are 15 Spruance class destroyers assigned to COMNAVSURFPAC. A sample of seven ships were chosen for this study. Table II presents general information about the ships studied.

TABLE II DD General Information

| Ships Name | Hull Number | Homeport |
|---|---|---|
| USS Elliot | DD-967 | San Diego, Ca |
| USS John Young | DD-973 | San Diego, Ca |
| USS O'Brien | DD-975 | San Diego, Ca |
| USS Merrill | DD-976 | San Diego, Ca |
| USS Leftwich | DD-984 | Pearl Harbor, Hi |
| USS Fife | DD-991 | San Diego, Ca |
| USS Fletcher | DD-992 | San Diego, Ca |

## E. OPTAR GRANT DATA

The Ships OPTAR Detail Listing provides summary data of OPTAR grants made to fleet units by the comptroller for a particular fiscal year. The report is a computer listing of all OPTAR grants made to COMNAVSURFPAC units. Funds are categorized as repair parts (RP) or other OPTAR (OO) and are broken down by quarters. Each grant of funds is given a name which describes the purpose of the allocation. Table III provides a list of some of the more common grant types.

TABLE III Common OPTAR Grant Types

| Grant Types | Description |
|---|---|
| BOPTAR | Budgeted OPTAR. Initial quarterly OPTAR grant. |
| LOAN | A loan from future BOPTARs. |
| C&H | Charter and hire services. OO funds used to fund port visits. |
| ILO | Integrated logistics overhaul. RP funds used to correct deficiencies in onboard repair parts inventories. |
| HIP | Habitability improvement program. OO funds used to improve living conditions aboard ship. |
| REPROG | Reprogramming of funds from RP to OO funds. |
| RECOUP | Recoupment of funds. |
| GEN | General allocation for miscellaneous reasons. |

Both of the previous studies used OPTAR obligation data. OPTAR grant data will be used in this study for the following four reasons:

### 1. Grant Data Accuracy

The first reason to use OPTAR grant data is for increased accuracy. Hanson and Kuker utilized combinations of fund codes (cost codes) that approximated the broad allocation categories utilized by the comptroller. They grouped repair part fund codes into a repair parts group and other fund codes into

an other category. This is precisely how OPTAR funds are provided to ships. They noted,

> In general, the comparisons proved the models to be accurate. The combination of cost codes increased the total dollar value and therefore decrease the significance of small errors. The accuracy of the combinations is highly significant considering the small size of the database. (Hanson and Kuker, 1988, pp. 59)

Therefore, the use of OPTAR grant data in this study is consistent with the grouping method Hanson and Kuker found to be most useful and accurate. The advantage of using the grant data is that it is already in the grouped format.

### 2. Simplicity

The second reason to use OPTAR grant data is for simplicity. Hanson and Kuker listed 28 fund codes that any ship could have used for obligation reporting purposes. Their final model contained 13 fund codes. Since obligation data is reported three times per month, they could have used up to 1,008 data points per ship per year. While the large number is useful for model development, it becomes a handicap from the implementation point of view. By utilizing summary OPTAR grant data, that is the total amount of funds actually allocated to a ship for a particular quarter in the RP and OO categories, the number of possible data points per ship per year drops to eight. Therefore, the models developed by Hanson and Kuker are not practical from the standpoint of quarterly budget allocation. This was the reason cited by the comptroller for not implementing the models developed by Hanson and Kuker.

### 3. Minimal Differences

The third reason for utilizing OPTAR grant data instead of obligation data is that ships normally spend their entire quarterly OPTAR grants in the quarter allocated. Large amounts of unobligated funds are usually reallocated elsewhere by the comptroller. Therefore OPTAR grant data closely approximates obligation data on a quarterly basis.

### 4. Purpose

The final rationale, and perhaps the most important, for utilizing actual quarterly OPTAR grant data is that the purpose of the fund expenditure is usually revealed. Obligation data identifies only the amount, timing and the specific type of material acquired. With OPTAR grant data the purpose of the allocation can be ascertained, i.e. habitability improvement funds or funds for charter and hire services. This is useful information because some of these allocations, and therefore expenditures, are not directly related to the employment schedule or to the maintenance requirements of a ship.

Integrated logistic overhaul (ILO) and habitability improvement (HIP) allocations intuitively either bear little correlation to the employment schedule or, in the case of HIP funds, are discretionary expenditures that can typically be planned for in advance. Because of these traits these two categories will be singled out for further analysis.

The ILO grants are relatively large RP fund expenditures made to purchase repair parts. These repair parts are purchased to replace shortages in repair part inventory levels as a result of the wall-to-wall repair parts inventory conducted during an ILO. The magnitude of these allocations are really a function of how well the repair parts inventory was managed between ILO's. They are not related to the

the repair parts inventory was managed between ILO's. They are not related to the ships schedule. This thesis will not attempt to develop a model for the prediction of ILO shortages.

The HIP grants on the other hand represent expenditures that are generally considered discretionary and can therefore be planned for in advance. A typical HIP project would be a refurbishment of the Enlisted Dining Facility. The project may require a contract to a local company for all or part of the project depending on the ships force workload and technical capability. HIP projects are funded with OO funds.

The other OPTAR grant types are all considered either related to the employment schedule or nondiscretionary and will be grouped together for analysis. The OPTAR grant data found in appendix A is listed by fund category, either RP or OO, and broken down by quarters and are presumably indicative of the need for these funds as the ship's employment schedule is carried out. The purpose of this study is to ascertain this relationship and estimate the parameter values for future planning purposes. The ILO and HIP grants are listed separately but are included in the RP, OO and TOTAL OPTAR grants.

## F. EMPLOYMENT DATA

Employment data was obtained from the Quarterly Employment Schedules for the fiscal years 1985 through 1988. The employment schedules contain detailed histories of a ships' actual activities for a particular fiscal quarter. The employment data was converted from a daily schedule to a monthly one for purposes of this analysis.

The employment categories utilized in this study are summarized in Table IV below.

TABLE IV Employment Categories

| Category | Description |
|---|---|
| SRA | Selected Restricted Availability. A short, usually two to three month maintenance period. |
| OVHL | Overhaul. A much longer maintenance period, typically one to two years. |
| DEPL | Deployment. An extended period away from homeport, normally six months. |
| POM | PreOverseas Movement. The two months immediately preceding a deployment. |

Appendix B details the converted scheduling information used in this analysis. Each ship's schedule is summarized for the four fiscal years 1985-1988. The number of months a ship is in a particular employment category, for a particular quarter, is listed for each category with the exception of POM. The POM value is a dummy variable, either zero or one. The dummy variable is used to represent the quarter in which the two month POM period would have begun. For example, in a quarter where the ship started a deployment and was deployed for only one month, the POM quarter would be that quarter. Where a ship started a deployment and was deployed for two or three months that quarter, the POM quarter would be the preceding quarter. This corresponds to the time when additional OPTAR funds are likely to have been granted.

After data collection and conversion a multiple regression analysis is conducted to determine the feasibility of developing a useable model for the comptroller.

# III. DATA ANALYSIS

The Hanson and Kuker model was developed by applying linear multiple regression analysis techniques. Utilizing the data in appendix A and B, the same regression analysis techniques were used to develop the following sets of OPTAR allocation models for each class of ships.

For each ship class, three models are developed. The three dependent variables in these models are RP, OO, and TOTAL. These are the variables that the forecasting model will predict. The RP and OO variables represent the total repair parts and other funds, respectively, that a ship will require that fiscal quarter. The TOTAL dependant variable is simply the addition of the RP and OO variables. All of these variables are expressed in thousands of dollars.

The independent variables SRA, OVHL, DEPL, and POM, represent the employment categories previously identified in Table IV. The SRA, OVHL, and DEPL variables are expressed in terms of the discrete number of months a ship was in that employment category (zero, one, two or three months per quarter). Since POM is a dummy variable, its value is either one, if the ship is in a POM status, or zero, if it is not in a POM status.

The following example may be helpful in understanding how these equations would be utilized to determine how much OPTAR to allocate to a particular ship.

To calculate the amount of RP funds a destroyer would need for a given fiscal quarter, the number of months in the quarter that the ship will be in the categories SRA, OVHL, and DEPL must be known. It also must be determined if the ship will be in a POM status that quarter.

Let us say that the destroyer will be on deployment (DEPL) for one month and in a preoverseas movement (POM) status for the quarter. The quarterly RP funds required for this ship would be computed using the equation found on page 18, as follows:

$$RP = 338 + 17.7(SRA) - 33.2(OVHL) - 21.7(DEPL) + 123(POM)$$

then substituting for the independent variables,

$$RP = 338 + 17.7(0) - 33.2(0) - 21.7(1) + 123(1)$$

$$RP = 493.3$$

Since repair funds are expressed in thousands of dollars, $493,300.00 in repair parts (RP) funds are required for this destroyer for this quarter.

In the following analysis, the actual OPTAR grant data found in appendix A is regressed against the ship employment data found in appendix B.

## A. MULTIPLE REGRESSION ANALYSIS OF THE RAW DATA

The results of the multiple regression analysis for the Spruance class destroyers and the Newport class LST's are summarized below in Table V. The table identifies the coefficients for each of the four independent variables, plus the constant, for all three models for each class of ship. The equations to forecast each of the dependent variables can be read from left to right in the same manner described above. This analysis was conducted using only the raw data in the appendices.

TABLE V Initial Regression Results

| | | Constant | SRA | OVHL | DEPL | POM |
|---|---|---|---|---|---|---|
| Destroyer | RP | 338.0 | 17.7 | -33.2 | -21.7 | 123.0 |
| | OO | 109.0 | -5.6 | 4.5 | -5.1 | 14.7 |
| | TOTAL | 498.0 | 12.1 | -28.7 | -27.5 | 138.0 |
| LST | RP | 114.0 | -1.5 | 19.5 | -6.8 | 34.3 |
| | OO | 104.0 | -4.2 | 0.5 | -4.0 | 22.3 |
| | TOTAL | 218.0 | -5.7 | 20.0 | -10.8 | 56.7 |

Table V shows that the coefficients for deployment were all negative while the POM coefficients were all positive for both ship classes as expected. This means that more funds are spent in the two month POM period prior to deployment and less funds are spent by deployed ships. This confirms the intuitive belief that funds are spent immediately preceding a deployment for ship repair and inventory replenishment in preparation for deployment. While on deployment, fund requirements decline because of a decrease in emphasis on ship repair and an increased emphasis on underway operations.

The coefficients for SRA and overhaul were mixed between the ship classes. The destroyers had a positive coefficient for SRA and a negative one for overhaul in the RP fund category. This would seem to indicate that destroyers do a significant amount of ships force work during SRA's but not during overhauls. The opposite appears to be true for the LST's suggesting that LST's do most of their work in overhauls. This issue will be explored further after HIP and ILO allocation corrections are made.

The following statistics provide additional details from the statistical analysis regarding the coefficients summarized in Table V.

## Initial Regression Results

### Destroyer Statistics

RP= 338 + 17.7 SRA - 33.2 OVHL -21.7 DEPL + 123 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 21.46 | $R^2$ | 16.0% |
| SRA | 0.86 | $R^2$-adjusted | 12.9% |
| OVHL | -2.37 | D-W statistic | 1.56 |
| DEPL | -1.69 | F-ratio | 5.11 |
| POM | 2.87 | | |

where RP = the total amount of repair parts funds to be allocated to a destroyer for a given quarter.

OO= 109 - 5.56 SRA + 4.46 OVHL - 5.81 DEPL + 14.7 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 14.61 | $R^2$ | 3.2% |
| SRA | -0.66 | $R^2$-adjusted | 0.0% |
| OVHL | 0.77 | D-W statistic | 2.20 |
| DEPL | -1.10 | F-ratio | 0.89 |
| POM | 0.83 | | |

where OO = the total amount of other OPTAR funds to be allocated to a destroyer for a given quarter.

TOTAL= 498 + 12.1 SRA - 28.7 OVHL - 27.5 DEPL + 138 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 26.08 | $R^2$ | 16.0% |
| SRA | 0.56 | $R^2$-adjusted | 12.8% |
| OVHL | -1.95 | D-W statistic | 1.59 |
| DEPL | -2.04 | F-ratio | 5.08 |
| POM | 3.04 | | |

where TOTAL = the total amount of repair parts and other funds to be allocated to a destroyer for a given quarter.

## LST Statistics

RP= 114 - 1.54 SRA + 19.5 OVHL - 6.8 DEPL + 34.3 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 29.94 | $R^2$ | 33.5% |
| SRA | -0.52 | $R^2$-adjusted | 31.6% |
| OVHL | 5.71 | D-W statistic | 1.82 |
| DEPL | -2.93 | F-ratio | 17.50 |
| POM | 4.32 | | |

where RP = the total amount of repair parts funds to be allocated to an LST for a given quarter.

OO= 104 - 4.19 SRA + 0.52 OVHL - 4.03 DEPL + 22.3 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 22.90 | $R^2$ | 7.0% |
| SRA | -1.17 | $R^2$-adjusted | 4.3% |
| OVHL | 0.13 | D-W statistic | 2.01 |
| DEPL | -1.45 | F-ratio | 2.61 |
| POM | 2.34 | | |

where OO = the total amount of other OPTAR funds to be allocated to an LST for a given quarter.

TOTAL= 218 - 5.73 SRA + 20.0 OVHL - 10.8 DEPL + 56.7 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 33.81 | $R^2$ | 24.7% |
| SRA | -1.13 | $R^2$-adjusted | 22.5% |
| OVHL | 3.45 | D-W statistic | 1.75 |
| DEPL | -2.75 | F-ratio | 11.39 |
| POM | 4.20 | | |

where TOTAL = the total amount of repair parts and other funds to be allocated to an LST for a given quarter.

Note that the results for Other OPTAR (OO) for both ship classes are statistically insignificant. In the next section the raw data will be corrected for the effects of the Integrated Logistic Overhaul (ILO) and Habitability Improvement Program (HIP) allocations and new regression models will be developed.

## B. CORRECTION FOR ILO AND HIP ALLOCATIONS

In Chapter II, funding for ILO and HIP OPTAR grants was discussed. It was proposed that the model should not include these allocations because they are generally unrelated to the employment schedule. To determine the effects of correcting for ILO and HIP OPTAR grants a new set of models, with those fund allocations subtracted out, is presented in Table VI.

**TABLE VI Regression Results After ILO and HIP Correction**

| | | Constant | SRA | OVHL | DEPL | POM |
|---|---|---|---|---|---|---|
| **Destroyer** | RP-ILO | 339.0 | 1.7 | -39.5 | -21.8 | 123.0 |
| | OO-HIP | 106.0 | -6.4 | 4..1 | -5.3 | 11.3 |
| | TOTAL | 494.0 | -4.6 | -35.5 | -27.1 | 138.0 |
| **LST** | RP-ILO | 114.0 | -1.8 | 13.7 | -6.8 | 34.3 |
| | OO-HIP | 101.0 | -4.0 | -0.8 | -3.9 | 23.7 |
| | TOTAL | 215.0 | -5.7 | 12.9 | -10.7 | 58.0 |

As anticipated, the coefficients for deployment and POM were unaffected by the change. The selected restricted availability (SRA) and overhaul (OVHL) coefficients however were affected. The SRA coefficient for RP dropped by $16,000.00 to a value of $1,700.00 for the destroyers. The result of the ILO manipulation makes it apparent that the destroyers don't really do more ships force work in SRA's. They merely get large ILO allocations to conduct integrated logistic overhaul's then.

It is interesting to note that the overhaul RP and TOTAL coefficients for the destroyers are negative while the same coefficients for the LST's are positive. One hypothesis for this is that the destroyers, with all their high tech electronic systems, require significantly less money in overhaul because of the lack of maintenance

being done on their sophisticated electronic systems. This is because these systems are frequently removed and upgraded, or replaced entirely with new systems, as a part of the overhaul work package. Even though the ships' force may be doing significantly more work on the hull, mechanical and electrical systems as the LST's appear to be doing, it is not enough to compensate for the high cost of maintaining sophisticated electronic weapons systems. The LST's of course do not have the sophisticated sonar, radar and fire control systems aboard them and therefore the decrease in their costs to maintain such equipment is not as great as the increased work load by ships force in the other areas.

The following statistics provide additional details from the statistical analysis regarding the coefficients summarized in Table VI.

**Regression Results After ILO and HIP Correction**

**Destroyer Statistics**

RP-ILO= 339 + 1.7 SRA - 39.5 OVHL - 21.8 DEPL + 123 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 21.91 | $R^2$ | 17.5% |
| SRA | 0.09 | $R^2$-adjusted | 14.4% |
| OVHL | -2.88 | D-W statistic | 1.41 |
| DEPL | -1.73 | F-ratio | 5.66 |
| POM | 2.92 | | |

where RP-ILO = the total amount of repair parts funds to be allocated to a destroyer for a given quarter less any ILO allocations.

$$OO\text{-}HIP = 106 - 6.35\ SRA + 4.09\ OVHL - 5.29\ DEPL + 11.3\ POM$$

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 14.19 | $R^2$ | 2.7% |
| SRA | -0.75 | $R^2$-adjusted | 0.0% |
| OVHL | 0.71 | D-W statistic | 2.20 |
| DEPL | -1.00 | F-ratio | 0.75 |
| POM | 0.64 | | |

where OO-HIP = the total amount of other OPTAR funds to be allocated to a destroyer for a given quarter less any HIP allocations.

$$TOTAL = 494 - 4.6\ SRA - 35.5\ OVHL - 27.1\ DEPL + 134\ POM$$

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 26.52 | $R^2$ | 17.0% |
| SRA | -0.22 | $R^2$-adjusted | 13.9% |
| OVHL | -2.46 | D-W statistic | 1.47 |
| DEPL | -2.05 | F-ratio | 5.48 |
| POM | 3.03 | | |

where TOTAL = the total amount of repair parts and other funds to be allocated to a destroyer for a given quarter less any ILO or HIP allocations.

## LST Statistics

$$RP\text{-}ILO = 114 - 1.76\ SRA + 13.7\ OVHL - 6.82\ DEPL + 34.3\ POM$$

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 30.87 | $R^2$ | 28.3% |
| SRA | -0.61 | $R^2$-adjusted | 26.2% |
| OVHL | 4.13 | D-W statistic | 1.70 |
| DEPL | -3.03 | F-ratio | 13.69 |
| POM | 4.45 | | |

where RP-ILO = the total amount of repair parts funds to be allocated to an LST for a given quarter less any ILO allocations.

$$OO\text{-}HIP = 101 - 3.96\ SRA - 0.77\ OVHL - 3.91\ DEPL + 23.7\ POM$$

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 22.80 | $R^2$ | 7.6% |
| SRA | -1.13 | $R^2$-adjusted | 5.0% |
| OVHL | -0.19 | D-W statistic | 2.01 |
| DEPL | -1.44 | F-ratio | 2.86 |
| POM | 2.54 | | |

where OO-HIP = the total amount of other OPTAR funds to be allocated to an LST for a given quarter less any HIP allocations.

$$TOTAL = 215 - 5.72\ SRA + 12.9\ OVHL - 10.7\ DEPL + 58.0\ POM$$

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 33.76 | $R^2$ | 21.9% |
| SRA | -1.14 | $R^2$-adjusted | 19.7% |
| OVHL | 2.25 | D-W statistic | 1.77 |
| DEPL | -2.76 | F-ratio | 9.77 |
| POM | 4.35 | | |

where TOTAL = the total amount of repair parts and other funds to be allocated to an LST for a given quarter less any ILO and HIP allocations.

Notice again that the results for the other OPTAR models for both ship classes are statistically insignificant.

## C. THE BEST EXPLANATORY VARIABLES

It is apparent from a review of the t-ratio's associated with the coefficients in the models above that some of the independent variables do a better job explaining the variations in the dependent variables. Table VII summarizes the independent variable t-ratio's, from the last set of models.

TABLE VII Independent Variable t-ratio's

| | | Constant | SRA | OVHL | DEPL | POM |
|---|---|---|---|---|---|---|
| Destroyer | RP-ILO | 29.9 | 0.1 | -2.9 | -1.73 | 2.92 |
| | OO-HIP | 14.2 | -0.8 | 0.7 | -1.0 | 0.6 |
| | TOTAL | 26.5 | -0.2 | -2.5 | -2.1 | 3.0 |
| LST | RP-ILO | 30.9 | -0.6 | 4.1 | -3.0 | 4.5 |
| | OO-HIP | 22.8 | -1.1 | -0.2 | -1.4 | 2.5 |
| | TOTAL | 33.7 | -1.1 | 2.3 | -2.8 | 4.4 |

The SRA category generally has the lowest t-ratio's, all less than two, which are insignificant statistically. By eliminating the SRA variable from the models only a slight decrease in $R^2$ along with an increase in the relative strength of the other variables, as evidenced by increased t-ratio's, is expected.

The results of the new set of regressions for the modified data sets is summarized below in Table VIII.

TABLE VIII Best Model Regression Results

| | | Constant | OVHL | DEPL | POM |
|---|---|---|---|---|---|
| Destroyer | RP-ILO | 339.0 | -39.8 | -22.0 | 122.0 |
| | OO-HIP | 103.0 | 4.9 | -4.4 | 13.4 |
| | TOTAL | 493.0 | -34.8 | -26.4 | 136.0 |
| LST | RP-ILO | 112.0 | 14.1 | -6.4 | 35.2 |
| | OO-HIP | 98.7 | 0.2 | -3.0 | 25.6 |
| | TOTAL | 211.0 | 14.2 | -9.4 | 60.8 |

Table IX provides a summary comparison of the $R^2$ calculation for each of the models developed. From the table it is obvious that the ILO and HIP corrections which improved the destroyer models actually slightly degraded the LST models.

However, the deletion of the independent variable SRA from the model does not seem to significantly reduce the $R^2$ in the best model group of models when compared to the ILO and HIP correction models. In fact, when $R^2$ is adjusted for degrees of freedom, the models for both ship classes actually improves somewhat.

The table clearly shows that the OO models are not statistically significant as was noted previously.

**TABLE IX $R^2$ Comparison**

| Model | | Raw Data | | ILO & HIP Correction | | Best Model | |
|---|---|---|---|---|---|---|---|
| | | $R^2$ | $R^2$-adj | $R^2$ | $R^2$-adj | $R^2$ | $R^2$-adj |
| DD | RP | 16.0 | 12.9 | 17.5 | 14.4 | 17.5 | 15.2 |
| | OO | 3.2 | 0.0 | 2.7 | 0.0 | 2.2 | 0.0 |
| | TOTAL | 16.0 | 12.8 | 17.0 | 13.9 | 17.0 | 14.7 |
| LST | RP | 33.5 | 31.6 | 28.3 | 26.2 | 28.1 | 26.5 |
| | OO | 7.0 | 4.3 | 7.6 | 5.0 | 6.8 | 4.8 |
| | TOTAL | 24.7 | 22.5 | 21.9 | 19.7 | 21.2 | 19.5 |

The following statistics provide additional details from the statistical analysis regarding the coefficients summarized in Table VIII.

## Best Model Regression Results

### Destroyer Statistics

RP-ILO= 339 - 39.8 OVHL - 22 DEPL + 122 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 24.34 | $R^2$ | 17.5% |
| OVHL | -2.97 | $R^2$-adjusted | 15.2% |
| DEPL | -1.81 | D-W statistic | 1.41 |
| POM | 2.96 | F-ratio | 7.61 |

where RP-ILO = the total amount of repair parts funds to be allocated to a destroyer for a given quarter less any ILO allocations.

OO-HIP= 103 + 4.92 OVHL - 4.36 DEPL + 13.4 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 15.35 | $R^2$ | 2.2% |
| OVHL | 0.87 | $R^2$-adjusted | 0.0% |
| DEPL | -0.85 | D-W statistic | 2.20 |
| POM | 0.77 | F-ratio | 0.82 |

where OO-HIP = the total amount of other OPTAR funds to be allocated to a destroyer for a given quarter less any HIP allocations.

TOTAL= 493 - 34.8 OVHL - 26.4 DEPL + 136 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 29.30 | $R^2$ | 17.0% |
| OVHL | -2.47 | $R^2$-adjusted | 14.7% |
| DEPL | -2.07 | D-W statistic | 1.47 |
| POM | 3.12 | F-ratio | 7.36 |

where TOTAL = the total amount of repair parts and other funds to be allocated to a destroyer for a given quarter less any ILO or HIP allocations.

### LST Statistics

RP-ILO= 112 + 14.1 OVHL - 6.41 DEPL + 35.2 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 35.34 | $R^2$ | 28.1% |
| OVHL | 4.36 | $R^2$-adjusted | 26.5% |
| DEPL | -2.99 | D-W statistic | 1.69 |
| POM | 4.65 | F-ratio | 18.20 |

where RP-ILO = the total amount of repair parts funds to be allocated to an LST for a given quarter less any ILO allocations.

OO-HIP= 98.7 + 0.15 OVHL - 3.01 DEPL + 25.6 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 25.62 | $R^2$ | 6.8% |
| OVHL | 0.04 | $R^2$-adjusted | 4.8% |
| DEPL | -1.16 | D-W statistic | 1.98 |
| POM | 2.80 | F-ratio | 3.38 |

where OO-HIP = the total amount of other OPTAR funds to be allocated to an LST for a given quarter less any HIP allocations.

TOTAL= 211 + 14.2 OVHL - 9.42 DEPL + 60.8 POM

| Predictor | t-ratio | | |
|---|---|---|---|
| Constant | 38.24 | $R^2$ | 21.2% |
| OVHL | 2.54 | $R^2$-adjusted | 19.5% |
| DEPL | -2.53 | D-W statistic | 1.74 |
| POM | 4.63 | F-ratio | 12.56 |

where TOTAL = the total amount of repair parts and other funds to be allocated to an LST for a given quarter less any ILO and HIP allocations.

## D. USING THE EQUATIONS

The following three examples are provided to further clarify how these models would be used in making allocations to a ship. The equations used in these examples can be found on pages 26 and 27.

Example 1

Suppose the comptroller wanted to determine the amount of repair funds to allocate to the USS Peoria (LST-1183) for the next fiscal quarter. A review of the Peoria's employment schedule finds the ship in overhaul (OVHL) all three months. The Peoria's quarterly repair parts grant would equal the following:

$$RP = 112 + 14.1(OVHL) - 6.4(DEPL) + 35.2(POM)$$

$$RP = 112 + 14.1(3) - 6.4(0) + 35.2(0)$$

$$RP = 154.3 \quad \text{or } \$154{,}300.00.$$

Example 2

Next the repair funds for the USS Elliot (DD-967) need to be forecasted. The Elliot's employment schedule has her on deployment for three months. The Elliot's quarterly repair parts grant would equal the following:

$$RP = 339 - 39.8(OVHL) - 22(DEPL) + 122(POM)$$

$$RP = 339 - 39.8(0) - 22(3) + 122(0)$$

$$RP = 273 \quad \text{or } \$273{,}000.00.$$

Example 3

Finally the repair parts grant for the USS Tuscaloosa (LST-1187) must be determined. The Tuscaloosa's schedule has her in a POM status and on deployment for one month of the quarter. The Tuscaloosa's quarterly repair parts grant would equal:

$$RP = 112 + 14.1(OVHL) - 6.4(DEPL) + 35.2(POM)$$

$$RP = 112 + 14.1(0) - 6.4(1) + 35.2(1)$$

$$RP = 140.8 \quad \text{or } \$140{,}800.00.$$

## E. FORECASTING OPTAR ALLOCATIONS

The analysis of LST and destroyer OPTAR grants for the past four fiscal years led to these three observations:

1. The amount and timing of a ship's OPTAR allocation requirements depends on the ship's employment schedule to some degree.
2. Certain allocations, ILO and HIP, are not related to a ships employment schedule.
3. SRA's do not significantly impact OPTAR requirements.

To test the validity of the models, a mean absolute percentage error (MAPE) calculation was conducted. Hanson and Kuker found that MAPE was the best tool to numerically compare the forecasting strength of their models because it "scales the error measure for differences in the magnitude of the dollar values in the data." (Hanson and Kuker, 1988)

The results of the MAPE analysis are summarized in Table X below.

**TABLE X MAPE Results**
( Percent )

| Fund Category | LST | Destroyer |
|---|---|---|
| RP-ILO | 18.06 | 35.39 |
| OO-HIP | 27.57 | 36.16 |
| TOTAL | 15.96 | 24.43 |

The MAPE values for the cruiser and frigate models in the Hanson and Kuker study compare favorably to those in Table X. The cruisers had a MAPE of 6.8 percent and the frigates had a MAPE of 18.3 percent in their combined (TOTAL) categories.

The LST's in this study had lower MAPE's than the destroyers. This is in direct correlation to the relative strength of the models as shown in $R^2$ comparison in Table IX. The $R^2$ values for the LST models are about double that of the destroyers

indicating a much better fit for the LST models. Evidently an employment based model explains the OPTAR spending patterns better in LST's than in destroyers for reasons unknown.

The results in Table IX show that the OO models for both ship classes are not statistically significant. The amount of variation explained by the model is zero for the destroyer model, when adjusted for degrees of freedom, and only 4.8% for the LST model. Therefore, the inaccuracy of the OO models shown in Table X is expected. The poor validity of the OO models may be due to the nature of the type of the material and services acquired with OO funds. Office supplies, paint, cleaning materials, etc., are needed on a more or less constant basis and therefore do not relate as closely to the employment schedule.

The MAPE values for both TOTAL categories in Table X are lower due to the aggregation of RP-ILO and OO-HIP. This is the same result that Hanson and Kuker obtained.

# IV. CONCLUSIONS AND RECOMMENDATIONS

## A. CONCLUSIONS

The purpose of this thesis was to determine if it was possible to develop a simple, useful and reliable OPTAR forecasting and allocation model for the COMNAVSURFPAC comptroller. The models described in the preceding chapter meet those goals. With only three employment factors known in advance the comptroller is able to time, and predict, the OPTAR needs of his ships with a moderate amount of accuracy, as shown by the MAPE analysis in the preceding chapter.

The comparison of the MAPE analysis in the preceding chapter to the MAPE analysis done by Hanson and Kuker shows that these models are as reliable as the models developed by Hanson and Kuker. The ease of processing, the simplicity of use and, the ability to distinguish purpose should make quarterly OPTAR grant data preferable to obligation data for those attempting to develop a model for another ship class. While the obligation data seemed to be slightly more accurate than the quarterly OPTAR grant data used in this study, an unequivocal conclusion cannot be drawn because this hypothesis was not tested directly. It is left to those who follow to make the judgement as to which type of data is better.

It was demonstrated that ILO OPTAR grants have a significant impact upon the model. Intuitively ILO allocations bear no relationship to the operational schedule of a ship. They are, however, directly related to the performance of the personnel in charge of the inventory management function. Since ILO's are conducted infrequently, no attempt was made to incorporate ILO OPTAR grants into the

model. The effects of HIP OPTAR grants are less clear. This is due in part to the poor relationship between OO funds and the employment schedule.

One reason for the poor results obtained for OO funds may be the nature of the material and services procured by these funds. Service contracts for copier and computer equipment, telephone bills, office supplies, cleaning supplies, paint and preservation tools all tend to be a more or less constant drain on resources. These supplies are the type that are needed in roughly the same amounts by all ships in a class, day and night, rain or shine, underway or inport and therefore do not fare well in an employment schedule based model. Therefore, a constant value based on the average is the most appropriate model for OO allocation purposes.

Another conclusion of this study is that SRA's have virtually no relationship to a ship's OPTAR spending patterns. The reason for this may lie in the amount of work done during an SRA. Given their relatively short time periods, two to three months compared to the one to two years for an overhaul, only a limited amount of work can be done by the shipyard. Wholesale replacement of ship systems is unlikely, therefore expenditures for the maintenance for the most systems tend to stay relatively constant. In an overhaul the opposite is true. Wholesale replacement of ship systems is likely, therefore expenditures for the maintenance of these systems declines. In the case of the destroyers the decline is dramatic. The LST's, with their relatively low tech systems, do not exhibit this characteristic. They have a tendency to increase expenditures during overhaul, probably due to increased ships force work on systems not included in the overhaul work package. It is believed that the destroyers also increase their expenditures in the same way but that they are masked by the large decrease in spending for electronic systems.

For allocation purposes a model based on the last year's average OO allocation combined with the RP-ILO model presented here is recommended for each class of ships. This allocation model satisfies the original purpose of this thesis which was to develop a useable and reliable OPTAR forecasting and allocation model to assist the COMNAVSURFPAC comptroller in effectively allocating funds to the fleet. The following equations summarize this model:

**Destroyers**

OO Grant = Average quarterly OO grant for the previous year

RP Grant = $339,000.00 - $39,800.00 (the number of months in overhaul) - $22,000.00 (the number of months on deployment) + $122,000.00 (if in a POM quarter)

Total Grant = OO Grant + RP Grant

**LST's**

OO Grant = Average quarterly OO grant for the previous year

RP Grant = $112,000.00 + $14,100.00 (the number of months in overhaul) - $6,400.00 (the number of months on deployment) + $35,200.00 (if in a POM quarter)

Total Grant = OO Grant + RP Grant

## B. RECOMMENDATIONS FOR FURTHER STUDY

To aid the comptroller in managing his allocation function other ship types should be studied so that a comprehensive surface force allocation model could be developed. The models developed here are applicable to only a small segment when considering the totality of the Pacific surface fleet.

An attempt to develop a model which helps to predict ILO shortages might be possible. While it will be difficult to objectively measure the quality of the inventory management function, it may be possible to estimate it. The following factors may be useful in developing such a model:

1. The inventory validity results of supply management inspection.
2. The amount of time since the last ILO was completed.
3. The supply management inspection grades in inventory management.
4. The total value of the inventory.
5. The amount of supply officer turnover.
6. Current inventory management policies.

Another interesting area of study might be the integration of the allocation models into the budgetary process. As the comptrollers forecasting ability improves with the increased use of the models, the usefulness of these models as an input to the budget cycle will become more evident. Since deployment rotations and overhauls are typically planned for years in advance, it may be possible to use a model similar to the one developed in this thesis.

A study of the funding requirements of ship classes as they compete for funds within the fleet might be enlightening. The movement of funds between ship types with different mission priorities and the adequacy of class funding might yield interesting and useful insights into the allocation process.

The type and number of different weapons systems aboard ships within a class may impact upon OPTAR spending. A study of the effects new systems have on a ships spending patterns may be of some use. The comptroller is currently testing an allocation model for fiscal year 1989 that takes into account the number of extra systems, as compared to the class average, a ship has aboard it. These ships are then given extra OPTAR funds to compensate for the extra equipment. A study that

quantifies the relationship between additional systems and OPTAR spending would be useful.

The effects of inflation on the allocation process were not studied. Another study documenting the effects of inflation on the model may be useful for the comptroller.

Another way to test the validity of this model would be to conduct the same analysis on ships in the Atlantic fleet. It may be possible to develop a generic model for all ship's in a class.

Finally, further work could be done to update these models with 1989 data as it becomes available.

# APPENDIX A - OPTAR GRANT DATA

USS ELLIOT (DD-967)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 480.0 | 79.7 | 559.7 | 0.0 | 0.0 |
| | 2 | 346.7 | 124.7 | 471.4 | 0.0 | 21.4 |
| | 3 | 426.7 | 100.1 | 526.8 | 0.0 | 0.0 |
| | 4 | 416.6 | 114.1 | 530.7 | 0.0 | 0.0 |
| 1986 | 1 | 410.0 | 79.1 | 489.1 | 0.0 | 0.0 |
| | 2 | 330.0 | 68.0 | 398.0 | 0.0 | 0.0 |
| | 3 | 323.4 | 89.2 | 412.6 | 0.0 | 16.8 |
| | 4 | 423.4 | 127.5 | 550.9 | 0.0 | 0.0 |
| 1987 | 1 | 490.0 | 152.3 | 642.3 | 0.0 | 0.0 |
| | 2 | 406.7 | 61.0 | 467.7 | 0.0 | 0.0 |
| | 3 | 381.7 | 74.7 | 456.4 | 0.0 | 18.0 |
| | 4 | 81.6 | 138.0 | 219.6 | 0.0 | 0.0 |
| 1988 | 1 | 165.0 | 138.0 | 303.0 | 0.0 | 0.0 |
| | 2 | 198.0 | 105.0 | 303.0 | 0.0 | 0.0 |
| | 3 | 310.8 | 113.0 | 423.8 | 120.8 | 0.0 |
| | 4 | 173.9 | 168.7 | 342.6 | 0.0 | 0.0 |

USS FIFE (DD-991)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 630.0 | 74.0 | 704.0 | 0.0 | 0.0 |
| | 2 | 696.7 | 153.9 | 850.6 | 0.0 | 0.0 |
| | 3 | 696.7 | 167.0 | 863.7 | 0.0 | 21.7 |
| | 4 | 321.6 | 140.4 | 462.0 | 0.0 | 0.0 |
| 1986 | 1 | 400.0 | 89.1 | 489.1 | 0.0 | 0.0 |
| | 2 | 333.3 | 71.8 | 405.1 | 0.0 | 0.0 |
| | 3 | 401.6 | 86.5 | 488.1 | 0.0 | 18.0 |
| | 4 | 383.7 | 324.0 | 707.7 | 0.0 | 0.0 |
| 1987 | 1 | 221.0 | 157.0 | 378.0 | 0.0 | 0.0 |
| | 2 | 264.0 | 114.0 | 378.0 | 0.0 | 0.0 |
| | 3 | 391.8 | 170.5 | 562.3 | 162.3 | 18.9 |
| | 4 | -77.3 | 255.3 | 178.0 | 0.0 | 0.0 |
| 1988 | 1 | 289.0 | 123.5 | 412.5 | 0.0 | 0.0 |
| | 2 | 334.0 | 70.2 | 404.2 | 0.0 | 0.0 |
| | 3 | 334.0 | 77.4 | 411.4 | 0.0 | 0.0 |
| | 4 | 322.0 | 75.0 | 397.0 | 0.0 | 0.0 |

USS FLETCHER (DD-992)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 570.9 | 117.0 | 687.9 | 0.0 | 0.0 |
| | 2 | 368.7 | 105.8 | 474.5 | 0.0 | 0.0 |
| | 3 | 411.9 | 100.1 | 512.0 | 0.0 | 12.3 |
| | 4 | 310.6 | 112.7 | 423.3 | 0.0 | 0.0 |
| 1986 | 1 | 390.0 | 75.1 | 465.1 | 0.0 | 0.0 |
| | 2 | 336.7 | 86.2 | 422.9 | 0.0 | 0.0 |
| | 3 | 330.0 | 84.0 | 414.0 | 0.0 | 15.1 |
| | 4 | 377.5 | 412.6 | 790.1 | 0.0 | 0.0 |
| 1987 | 1 | 315.0 | 63.0 | 378.0 | 0.0 | 0.0 |
| | 2 | 315.0 | 70.7 | 385.7 | 0.0 | 7.7 |
| | 3 | 215.0 | 163.0 | 378.0 | 0.0 | 0.0 |
| | 4 | 85.0 | 33.0 | 118.0 | 0.0 | 0.0 |
| 1988 | 1 | 315.0 | 63.0 | 378.0 | 0.0 | 0.0 |
| | 2 | 295.0 | 88.7 | 383.7 | 0.0 | 20.0 |
| | 3 | 230.0 | 97.4 | 327.4 | 0.0 | 0.0 |
| | 4 | 314.5 | 74.7 | 389.2 | 0.0 | 0.0 |

USS JOHN YOUNG (DD-973)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 581.2 | 116.2 | 697.4 | 0.0 | 0.0 |
| | 2 | 324.7 | 78.8 | 403.5 | 0.0 | 0.0 |
| | 3 | 509.2 | 85.2 | 594.4 | 0.0 | 22.5 |
| | 4 | 466.6 | 115.7 | 582.3 | 0.0 | 0.0 |
| 1986 | 1 | 410.0 | 119.1 | 529.1 | 0.0 | 0.0 |
| | 2 | 430.0 | 70.9 | 500.9 | 0.0 | 0.0 |
| | 3 | 332.6 | 78.8 | 411.4 | 0.0 | 21.6 |
| | 4 | 332.6 | 60.7 | 393.3 | 0.0 | 0.0 |
| 1987 | 1 | 328.2 | 94.8 | 423.0 | 0.0 | 0.0 |
| | 2 | 342.0 | 64.0 | 406.0 | 0.0 | 0.0 |
| | 3 | 342.0 | 113.4 | 455.4 | 0.0 | 15.2 |
| | 4 | 342.0 | 44.8 | 386.8 | 0.0 | 0.0 |
| 1988 | 1 | 342.0 | 82.7 | 424.7 | 0.0 | 0.0 |
| | 2 | 342.0 | 68.7 | 410.7 | 0.0 | 0.0 |
| | 3 | 342.0 | 64.1 | 406.1 | 0.0 | 0.0 |
| | 4 | 728.0 | 111.5 | 839.5 | 0.0 | 0.0 |

USS LEFTWICH (DD-984)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 402.0 | 80.9 | 482.9 | 0.0 | 0.0 |
| | 2 | 380.0 | 78.4 | 458.4 | 0.0 | 0.0 |
| | 3 | 380.0 | 95.2 | 475.2 | 0.0 | 18.1 |
| | 4 | 793.9 | 95.8 | 889.7 | 71.1 | 0.0 |
| 1986 | 1 | 240.0 | 181.7 | 421.7 | 0.0 | 0.0 |
| | 2 | 403.0 | 92.2 | 495.2 | 0.0 | 18.0 |
| | 3 | 343.0 | 78.4 | 421.4 | 0.0 | 0.0 |
| | 4 | 493.0 | 90.6 | 583.6 | 0.0 | 0.0 |
| 1987 | 1 | 445.0 | 89.1 | 534.1 | 0.0 | 0.0 |
| | 2 | 371.7 | 56.4 | 428.1 | 0.0 | 0.0 |
| | 3 | 506.7 | 94.8 | 601.5 | 0.0 | 18.0 |
| | 4 | 346.6 | 173.4 | 520.0 | 0.0 | 0.0 |
| 1988 | 1 | 342.0 | 63.0 | 405.0 | 0.0 | 0.0 |
| | 2 | 342.0 | 75.2 | 417.2 | 0.0 | 0.0 |
| | 3 | 342.0 | 65.7 | 407.7 | 0.0 | 0.0 |
| | 4 | 342.2 | 183.9 | 526.1 | 0.0 | 0.0 |

USS MERRILL (DD-976)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 380.0 | 74.0 | 454.0 | 0.0 | 0.0 |
| | 2 | 380.0 | 244.9 | 624.9 | 0.0 | 22.1 |
| | 3 | 511.5 | 84.5 | 596.0 | 0.0 | 0.0 |
| | 4 | 648.8 | 104.1 | 752.9 | 95.2 | 0.0 |
| 1986 | 1 | 440.0 | 70.0 | 510.0 | 0.0 | 0.0 |
| | 2 | 385.0 | 155.7 | 540.7 | 0.0 | 18.0 |
| | 3 | 421.4 | 55.5 | 476.9 | 0.0 | 0.0 |
| | 4 | 288.2 | 206.7 | 494.9 | 0.0 | 0.0 |
| 1987 | 1 | 315.0 | 74.2 | 389.2 | 0.0 | 0.0 |
| | 2 | 315.0 | 85.0 | 400.0 | 0.0 | 18.0 |
| | 3 | 484.3 | 67.0 | 551.3 | 169.3 | 4.0 |
| | 4 | 315.0 | 95.3 | 410.3 | 0.0 | 0.0 |
| 1988 | 1 | 342.0 | 104.6 | 446.6 | 0.0 | 0.0 |
| | 2 | 342.6 | 54.9 | 397.5 | 0.0 | 0.0 |
| | 3 | 342.8 | 92.0 | 434.8 | 0.0 | 0.0 |
| | 4 | 252.0 | 138.5 | 390.5 | 0.0 | 0.0 |

USS O'BRIEN (DD-975)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 604.4 | 106.2 | 710.6 | 0.0 | 0.0 |
| | 2 | 380.0 | 135.0 | 515.0 | 0.0 | 28.3 |
| | 3 | 584.7 | 101.2 | 685.9 | 0.0 | 0.0 |
| | 4 | 618.0 | 119.5 | 737.5 | 0.0 | 0.0 |
| 1986 | 1 | 760.0 | 191.9 | 951.9 | 0.0 | 18.0 |
| | 2 | 505.1 | 65.8 | 570.9 | 0.0 | 0.0 |
| | 3 | 237.5 | 82.3 | 319.8 | 0.0 | 0.0 |
| | 4 | 460.2 | 120.9 | 581.1 | 0.0 | 0.0 |
| 1987 | 1 | 342.0 | 87.4 | 429.4 | 0.0 | 0.0 |
| | 2 | 342.0 | 91.8 | 433.8 | 0.0 | 0.0 |
| | 3 | 342.0 | 131.0 | 473.0 | 0.0 | 18.0 |
| | 4 | 507.0 | 46.3 | 553.3 | 0.0 | 0.0 |
| 1988 | 1 | 550.0 | 104.4 | 654.4 | 0.0 | 0.0 |
| | 2 | 625.0 | 144.0 | 769.0 | 0.0 | 0.0 |
| | 3 | 75.0 | 61.5 | 136.5 | 0.0 | 0.0 |
| | 4 | 92.0 | 178.7 | 270.7 | 0.0 | 0.0 |

USS BARBOUR COUNTY (LST-1195)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 121.0 | 90.0 | 211.0 | 0.0 | 0.0 |
| | 2 | 121.0 | 84.0 | 205.0 | 0.0 | 0.0 |
| | 3 | 215.0 | 155.8 | 370.8 | 0.0 | 0.0 |
| | 4 | 172.0 | 152.9 | 324.9 | 0.0 | 0.0 |
| 1986 | 1 | 231.0 | 91.2 | 322.2 | 0.0 | 0.0 |
| | 2 | 129.0 | 83.5 | 212.5 | 0.0 | 0.0 |
| | 3 | 79.7 | 106.6 | 186.3 | 0.0 | 8.4 |
| | 4 | 79.7 | 113.9 | 193.6 | 0.0 | 0.0 |
| 1987 | 1 | 100.0 | 79.0 | 179.0 | 0.0 | 0.0 |
| | 2 | 100.0 | 70.4 | 170.4 | 0.0 | 0.0 |
| | 3 | 100.0 | 119.6 | 219.6 | 0.0 | 14.0 |
| | 4 | 120.0 | 161.0 | 281.0 | 0.0 | 0.0 |
| 1988 | 1 | 100.0 | 100.7 | 200.7 | 0.0 | 0.0 |
| | 2 | 100.0 | 56.5 | 156.5 | 0.0 | 0.0 |
| | 3 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| | 4 | 67.1 | 87.0 | 154.1 | 0.0 | 0.0 |

USS BRISTOL COUNTY (LST-1198)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 121.0 | 85.5 | 206.5 | 0.0 | 0.0 |
| | 2 | 230.0 | 84.0 | 314.0 | 0.0 | 0.0 |
| | 3 | 171.1 | 113.2 | 284.3 | 37.1 | 25.8 |
| | 4 | 144.0 | 122.1 | 266.1 | 0.0 | 0.0 |
| 1986 | 1 | 111.0 | 80.0 | 191.0 | 0.0 | 0.0 |
| | 2 | 111.0 | 183.7 | 294.7 | 0.0 | 13.9 |
| | 3 | 108.8 | 45.7 | 154.5 | 0.0 | 0.0 |
| | 4 | 108.8 | 49.5 | 158.3 | 0.0 | 0.0 |
| 1987 | 1 | 100.0 | 72.9 | 172.9 | 0.0 | 0.0 |
| | 2 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| | 3 | 100.0 | 92.6 | 192.6 | 0.0 | 11.3 |
| | 4 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| 1988 | 1 | 150.0 | 108.0 | 258.0 | 0.0 | 0.0 |
| | 2 | 110.3 | 63.5 | 173.8 | 0.0 | 0.0 |
| | 3 | 83.3 | 84.0 | 167.3 | 0.0 | 0.0 |
| | 4 | 142.4 | 75.4 | 217.8 | 0.0 | 0.0 |

USS CAYUGA (LST-1186)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 121.0 | 84.0 | 205.0 | 0.0 | 0.0 |
| | 2 | 197.8 | 194.0 | 391.8 | 0.0 | 0.0 |
| | 3 | 82.6 | 126.0 | 208.6 | 0.0 | 19.8 |
| | 4 | 82.6 | 95.7 | 178.3 | 0.0 | 0.0 |
| 1986 | 1 | 111.0 | 80.0 | 191.0 | 0.0 | 0.0 |
| | 2 | 111.0 | 80.0 | 191.0 | 0.0 | 0.0 |
| | 3 | 108.8 | 92.2 | 201.0 | 0.0 | 0.0 |
| | 4 | 125.0 | 135.7 | 260.7 | 0.0 | 0.0 |
| 1987 | 1 | 130.0 | 150.1 | 280.1 | 0.0 | 0.0 |
| | 2 | 119.6 | 90.2 | 209.8 | 0.0 | 0.0 |
| | 3 | 75.2 | 93.0 | 168.2 | 0.0 | 13.1 |
| | 4 | 80.2 | 107.0 | 187.2 | 0.0 | 0.0 |
| 1988 | 1 | 115.0 | 76.8 | 191.8 | 0.0 | 0.0 |
| | 2 | 98.0 | 134.1 | 232.1 | 0.0 | 0.0 |
| | 3 | 81.4 | 70.6 | 152.0 | 27.9 | 0.0 |
| | 4 | 108.9 | 101.7 | 210.6 | 0.0 | 0.0 |

USS FREDERICK (LST-1184)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 163.3 | 97.9 | 261.2 | 0.0 | 0.0 |
| | 2 | 106.9 | 84.0 | 190.9 | 0.0 | 0.0 |
| | 3 | 106.9 | 112.5 | 219.4 | 0.0 | 24.7 |
| | 4 | 106.9 | 119.5 | 226.4 | 0.0 | 0.0 |
| 1986 | 1 | 221.0 | 151.0 | 372.0 | 0.0 | 0.0 |
| | 2 | 65.2 | 88.2 | 153.4 | 0.0 | 0.0 |
| | 3 | 83.9 | 87.3 | 171.2 | 0.0 | 14.0 |
| | 4 | 90.7 | 100.2 | 190.9 | 0.0 | 0.0 |
| 1987 | 1 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| | 2 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| | 3 | 80.0 | 115.3 | 195.3 | 0.0 | 13.9 |
| | 4 | 100.0 | 89.8 | 189.8 | 0.0 | 0.0 |
| 1988 | 1 | 101.4 | 98.7 | 200.1 | 0.0 | 0.0 |
| | 2 | 90.0 | 83.8 | 173.8 | 0.0 | 0.0 |
| | 3 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| | 4 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |

USS FRESNO (LST-1182)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 121.0 | 84.0 | 205.0 | 0.0 | 0.0 |
| | 2 | 196.0 | 127.0 | 323.0 | 0.0 | 0.0 |
| | 3 | 149.0 | 174.5 | 323.5 | 0.0 | 27.8 |
| | 4 | 83.5 | 121.1 | 204.6 | 0.0 | 0.0 |
| 1986 | 1 | 145.0 | 80.0 | 225.0 | 0.0 | 0.0 |
| | 2 | 186.0 | 179.6 | 365.6 | 0.0 | 14.0 |
| | 3 | 88.8 | 122.0 | 210.8 | 0.0 | 0.0 |
| | 4 | 49.4 | 67.9 | 117.3 | 0.0 | 0.0 |
| 1987 | 1 | 100.0 | 82.1 | 182.1 | 0.0 | 0.0 |
| | 2 | 100.0 | 69.6 | 169.6 | 0.0 | 0.0 |
| | 3 | 120.9 | 108.8 | 229.7 | 0.0 | 13.8 |
| | 4 | 141.5 | 98.5 | 240.0 | 0.0 | 0.0 |
| 1988 | 1 | 75.0 | 97.0 | 172.0 | 0.0 | 0.0 |
| | 2 | 125.0 | 97.0 | 222.0 | 0.0 | 0.0 |
| | 3 | 158.0 | 72.0 | 230.0 | 0.0 | 0.0 |
| | 4 | 85.0 | 140.8 | 225.8 | 0.0 | 0.0 |

USS PEORIA (LST-1183)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 131.0 | 121.0 | 252.0 | 0.0 | 0.0 |
| | 2 | 253.0 | 80.7 | 333.7 | 67.7 | 0.0 |
| | 3 | 110.9 | 170.2 | 281.1 | 0.0 | 17.3 |
| | 4 | 173.8 | 296.5 | 470.3 | 0.0 | 0.6 |
| 1986 | 1 | 171.0 | 110.8 | 281.8 | 0.0 | 0.0 |
| | 2 | 91.0 | 95.2 | 186.2 | 0.0 | 0.0 |
| | 3 | 89.2 | 96.0 | 185.2 | 0.0 | 9.9 |
| | 4 | 107.7 | 104.2 | 211.9 | 0.0 | 0.0 |
| 1987 | 1 | 100.0 | 76.8 | 176.8 | 0.0 | 0.0 |
| | 2 | 100.0 | 97.1 | 197.1 | 0.0 | 13.7 |
| | 3 | 120.5 | 84.1 | 204.6 | 0.0 | 0.0 |
| | 4 | 68.0 | 137.4 | 205.4 | 0.0 | 0.0 |
| 1988 | 1 | 100.0 | 107.9 | 207.9 | 0.0 | 0.0 |
| | 2 | 100.0 | 71.9 | 171.9 | 0.0 | 0.0 |
| | 3 | 84.0 | 86.5 | 170.5 | 0.0 | 0.0 |
| | 4 | 85.0 | 14.0 | 99.0 | 0.0 | 0.0 |

USS SAN BERNARDINO (LST-1189)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 121.0 | 165.2 | 286.2 | 0.0 | 0.0 |
| | 2 | 160.5 | 45.8 | 206.3 | 39.5 | 12.5 |
| | 3 | 141.3 | 97.8 | 239.1 | 0.0 | 13.8 |
| | 4 | 145.8 | 141.1 | 286.9 | 0.0 | 0.0 |
| 1986 | 1 | 111.0 | 85.0 | 196.0 | 0.0 | 5.0 |
| | 2 | 153.4 | 128.1 | 281.5 | 0.0 | 14.0 |
| | 3 | 98.4 | 84.0 | 182.4 | 0.0 | 0.0 |
| | 4 | 98.4 | 253.8 | 352.2 | 0.0 | 0.0 |
| 1987 | 1 | 100.0 | 86.9 | 186.9 | 0.0 | 0.0 |
| | 2 | 100.0 | 86.8 | 186.8 | 0.0 | 0.0 |
| | 3 | 100.0 | 124.3 | 224.3 | 0.0 | 21.0 |
| | 4 | 100.0 | 95.2 | 195.2 | 0.0 | 0.0 |
| 1988 | 1 | 100.0 | 90.5 | 190.5 | 0.0 | 0.0 |
| | 2 | 100.0 | 91.7 | 191.7 | 0.0 | 0.0 |
| | 3 | 100.0 | 99.6 | 199.6 | 0.0 | 0.0 |
| | 4 | 100.0 | 160.0 | 260.0 | 0.0 | 0.0 |

USS SCHENECTADY (LST-1185)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 121.0 | 116.1 | 237.1 | 0.0 | 0.0 |
| | 2 | 121.0 | 87.9 | 208.9 | 0.0 | 8.0 |
| | 3 | 250.7 | 93.8 | 344.5 | 33.8 | 11.1 |
| | 4 | 121.0 | 129.3 | 250.3 | 0.0 | 0.0 |
| 1986 | 1 | 111.0 | 111.0 | 222.0 | 0.0 | 0.0 |
| | 2 | 111.0 | 114.6 | 225.6 | 0.0 | 14.0 |
| | 3 | 108.8 | 131.6 | 240.4 | 0.0 | 4.7 |
| | 4 | 136.3 | 181.9 | 318.2 | 0.0 | 0.7 |
| 1987 | 1 | 100.0 | 84.4 | 184.4 | 0.0 | 0.0 |
| | 2 | 100.0 | 82.9 | 182.9 | 0.0 | 0.0 |
| | 3 | 130.6 | 85.5 | 216.1 | 0.0 | 8.5 |
| | 4 | 119.0 | 100.5 | 219.5 | 0.0 | 5.5 |
| 1988 | 1 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| | 2 | 100.0 | 72.0 | 172.0 | 0.0 | 0.0 |
| | 3 | 99.3 | 77.5 | 176.8 | 0.0 | 0.0 |
| | 4 | 76.0 | 150.0 | 226.0 | 0.0 | 0.0 |

USS TUSCALOOSA (LST-1187)
($000)

| Fiscal Year | Quarter | RP | OO | Total | ILO | HIP |
|---|---|---|---|---|---|---|
| 1985 | 1 | 147.6 | 101.0 | 248.6 | 0.0 | 0.0 |
| | 2 | 112.1 | 133.5 | 245.6 | 0.0 | 23.0 |
| | 3 | 112.1 | 80.9 | 193.0 | 0.0 | 0.0 |
| | 4 | 112.1 | 106.6 | 218.7 | 0.0 | 0.0 |
| 1986 | 1 | 126.0 | 88.7 | 214.7 | 0.0 | 0.0 |
| | 2 | 141.0 | 104.9 | 245.9 | 0.0 | 14.0 |
| | 3 | 86.7 | 92.2 | 178.9 | 0.0 | 0.0 |
| | 4 | 86.7 | 87.5 | 174.2 | 0.0 | 0.0 |
| 1987 | 1 | 94.0 | 78.0 | 172.0 | 0.0 | 0.0 |
| | 2 | 100.0 | 72.1 | 172.1 | 0.0 | 0.0 |
| | 3 | 180.0 | 108.6 | 288.6 | 0.0 | 26.6 |
| | 4 | 140.0 | 101.8 | 241.8 | 0.0 | 0.0 |
| 1988 | 1 | 130.0 | 104.0 | 234.0 | 0.0 | 0.0 |
| | 2 | 126.0 | 78.0 | 204.0 | 0.0 | 0.0 |
| | 3 | 93.0 | 64.1 | 157.1 | 0.0 | 0.0 |
| | 4 | 141.3 | 141.4 | 282.7 | 0.0 | 0.0 |

# APPENDIX B - SHIP EMPLOYMENT DATA

USS ELLIOT (DD-967)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 2 | 0 |
| 1986 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 2 | 0 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 1 | 0 |
| 1988 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS FIFE (DD-991)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 2 | 0 |
| 1986 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 0 | 3 | 0 | 0 |
| | 2 | 0 | 3 | 0 | 0 |
| | 3 | 0 | 3 | 0 | 0 |
| | 4 | 0 | 3 | 0 | 0 |
| 1988 | 1 | 0 | 2 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS FLETCHER (DD-992)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 1 | 1 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 2 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 0 | 3 | 0 | 0 |
| | 2 | 0 | 3 | 0 | 0 |
| | 3 | 0 | 3 | 0 | 0 |
| | 4 | 0 | 3 | 0 | 0 |
| 1988 | 1 | 0 | 2 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS JOHN YOUNG (DD-973)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 3 | 0 |
| | 3 | 0 | 0 | 2 | 0 |
| | 4 | 1 | 0 | 0 | 0 |
| 1986 | 1 | 2 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 1 | 0 | 0 | 0 |
| | 2 | 2 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 2 | 0 |
| 1988 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 1 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS LEFTWICH (DD-984)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 2 | 0 | 0 |
| | 4 | 0 | 3 | 0 | 0 |
| 1986 | 1 | 0 | 3 | 0 | 0 |
| | 2 | 0 | 3 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 2 | 0 |
| 1988 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 1 | 0 |
| | 3 | 1 | 0 | 0 | 0 |
| | 4 | 1 | 0 | 0 | 0 |

USS MERRILL (DD-976)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 1 | 0 | 0 | 0 |
| | 4 | 3 | 0 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 1 | 1 |
| | 4 | 0 | 0 | 3 | 0 |
| 1987 | 1 | 0 | 0 | 1 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 |
| | 4 | 1 | 0 | 0 | 0 |
| 1988 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 3 | 0 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS O'BRIEN (DD-975)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 2 | 0 | 0 | 0 |
| | 3 | 1 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 2 | 0 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 1 | 0 |
| 1987 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 2 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1988 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 1 | 1 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 2 | 0 |

USS BARBOUR COUNTY (LST-1195)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 3 | 0 | 0 | 0 |
| | 2 | 3 | 0 | 0 | 0 |
| | 3 | 1 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 3 | 0 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 1 | 0 |
| 1987 | 1 | 3 | 0 | 0 | 0 |
| | 2 | 2 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 1 | 1 |
| 1988 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 2 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS BRISTOL COUNTY (LST-1198)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 3 | 0 | 0 |
| | 3 | 0 | 3 | 0 | 0 |
| | 4 | 0 | 2 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 1 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 3 | 0 |
| 1987 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 1 | 0 | 0 | 0 |
| | 3 | 2 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1988 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 3 | 0 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 1 | 0 |

USS CAYUGA (LST-1186)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 1 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 2 | 0 |
| 1986 | 1 | 1 | 0 | 0 | 0 |
| | 2 | 2 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 2 | 0 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 1 | 0 |
| 1988 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 3 | 0 | 0 | 0 |
| | 3 | 1 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS FREDERICK (LST-1184)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 1 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 1 | 1 |
| | 2 | 0 | 0 | 3 | 0 |
| | 3 | 0 | 0 | 2 | 0 |
| | 4 | 3 | 0 | 0 | 0 |
| 1987 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 1 | 1 |
| | 4 | 0 | 0 | 3 | 0 |
| 1988 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS FRESNO (LST-1182)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 3 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 2 | 0 | 0 | 0 |
| | 3 | 1 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 3 | 0 |
| 1987 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1988 | 1 | 2 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 1 | 1 |
| | 4 | 0 | 0 | 3 | 0 |

USS PEORIA (LST-1183)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 3 | 0 | 0 |
| | 2 | 0 | 3 | 0 | 0 |
| | 3 | 0 | 1 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 1 | 1 |
| | 2 | 0 | 0 | 3 | 0 |
| | 3 | 0 | 0 | 2 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 2 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 1 | 1 |
| | 4 | 0 | 0 | 3 | 0 |
| 1988 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS SAN BERNARDINO (LST-1189)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 3 | 0 | 0 |
| | 2 | 0 | 3 | 0 | 0 |
| | 3 | 0 | 3 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1987 | 1 | 3 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1988 | 1 | 3 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS SCHENECTADY (LST-1185)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 2 | 0 | 0 |
| | 3 | 0 | 3 | 0 | 0 |
| | 4 | 0 | 3 | 0 | 0 |
| 1986 | 1 | 0 | 1 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 1 |
| 1987 | 1 | 0 | 0 | 2 | 0 |
| | 2 | 0 | 0 | 2 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1988 | 1 | 3 | 0 | 0 | 0 |
| | 2 | 1 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |

USS TUSCALOOSA (LST-1187)
(Months)

| Fiscal Year | Quarter | SRA | Overhaul | Deployment | POM |
|---|---|---|---|---|---|
| 1985 | 1 | 0 | 0 | 0 | 1 |
| | 2 | 0 | 0 | 3 | 0 |
| | 3 | 0 | 0 | 1 | 0 |
| | 4 | 2 | 0 | 0 | 0 |
| 1986 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 3 | 0 |
| 1987 | 1 | 0 | 0 | 3 | 0 |
| | 2 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 |
| | 4 | 0 | 0 | 0 | 0 |
| 1988 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 0 | 0 | 0 | 1 |
| | 3 | 0 | 0 | 3 | 0 |
| | 4 | 0 | 0 | 3 | 0 |

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